



Tomorrow's Energy Today

for Cities and Counties

Build Up Energy Savings with Residential Standards

Investing your time and effort in residential energy efficiency standards will pay generous financial and environmental dividends to your community.

What policy can save energy, create jobs, and prevent pollution—all at low administrative cost? One that improves the energy efficiency of housing. And modifying residential building codes may be the easiest way to begin establishing a new energy policy for your community.

An innovative program in Austin, Texas, seeks to combine the benefits of energy-efficient construction with improvements in environmental quality. According to Doug Seiter, City of Austin, "Improving residential energy efficiency benefits both the local and global community." Seiter, manager of Austin's Energy Star / Green Builder Rating Program,

continues, "It's good for the economy and good for the environment."

In fiscal year 1991, for example, the Energy Star Rating Program saved about \$165,000 that would otherwise have been spent on heating and cooling homes, conserved more than 617,000 kilowatt-hours, and avoided emitting 834,000 pounds (378,000 kilograms) of the greenhouse gas, carbon dioxide.

And Seiter says that investments in energy-efficient buildings not only keep money in the community but also yield twice the number of local and regional jobs as the same investments in conventional energy supply. More money is retained within the local economy through increased energy savings.

Many new homes in Austin are rated under the city's Energy Star Rating Program for their energy efficiency. Doug Seiter, manager of the program, says homes are rated for site orientation, insulation, glazings, heat pumps, and other factors.

Voluntary and Mandatory Programs

So how do you begin to fashion a local residential energy efficiency program? Many independent organizations have developed energy standards for residential construction. Examples include

- *Model Energy Code*, a publication of the Council of American Building Officials, revised annually (see *For More Information*)



Kevin Virobik-Adams, Progressive Photo / VL1102

The U.S. Department of Energy's Code Program

Automated Residential Energy Standards (ARES), a computer program developed by the U.S. Department of Energy, can quickly and conveniently develop a location-specific residential energy standard. For more information on ARES and U.S. Department of Energy residential energy efficiency standards, contact:

Stephen J. Turchen
Office of Codes and Standards
U.S. Department of Energy, EE-43
1000 Independence Avenue, SW
Washington, DC 20585
(202) 586-6262

In addition, the U.S. Department of Energy funds the Building Energy Standards Program at the Pacific Northwest Laboratory. Its purpose is to encourage information exchange among building industry professionals and organizations, state and local code officials, and researchers. The goal is to encourage timely development and early adoption of building energy efficiency standards. For more information, contact:

Building Energy Standards Program
Pacific Northwest Laboratory
P.O. Box 999, MSIN K5-08
Richland, WA 99352
(800) 270-CODE (2633)

- *Energy-Efficient Design of New Low-Rise Residential Buildings*, approved by the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE) in June 1993 (see *For More Information*)
- Standards developed by the U.S. Department of Energy that local jurisdictions can use in a voluntary program or incorporate into local codes (see box on this page).

Voluntary Standards

Voluntary energy rating systems can be used alone or in conjunction with codes to encourage builders to find innovative ways to exceed minimum standards. As Seiter puts it, "Voluntary energy rating systems are 'win-win' strategies that complement, or sometimes replace, regulatory options to achieve efficiency goals in housing. The building industry is particularly supportive of this approach over mandatory standards, although the most effective approach appears to be a mix of the two."

A new approach, called the Home Energy Rating System, represents an important development in voluntary rating systems. Programs exist in nearly 40 states and are being considered in the rest. New and existing homes are rated for energy efficiency so lenders can take energy cost savings into account when underwriting mortgage loans. See *For More Information* for the address and phone number of the Home Energy Rating System Council.

Mandatory Codes

Once a standard is adopted as a local code, it becomes an enforceable requirement applied to all construction within the building department's jurisdiction. The advantage of making a standard mandatory is that the code establishes a baseline and—at least in theory—assures compliance with a minimum level of efficiency.

Disadvantages of mandating energy efficiency, however, include resistance from local builders and developers and the fact that prescriptive energy codes can stifle innovation.

In response, code officials in some areas have adopted a range of compliance options that build some flexibility into code enforcement. Typically, under such a program, a designer can demonstrate compliance by

- Prescriptive compliance—using a predetermined "package" of energy-efficiency measures
- Points compliance—using simple trade-offs of various energy efficiency measures, which are assigned point values
- Performance compliance—by modeling on a computer a proposed building's heating and cooling energy needs.

Offering building professionals these options can lead to more creative solutions to the challenge of meeting code requirements.

Case-study descriptions of a successful voluntary program and a successful mandatory approach follow.

Austin's Voluntary Energy Star Rating Program

The Energy Star Rating Program in Austin, Texas, is a voluntary program applying only to new residential construction. Using the city's energy code as a baseline, staff members generate ratings from one to three stars using the Building Energy Thermal Analysis (BETA) software. The point scale used to rate homes takes into account site orientation; insulation levels; glazings; solar screens; attic ventilation; roof radiant barriers; sheathing; heating, ventilating, and air-conditioning (HVAC) efficiencies; heat pump types; and fuels. One-star homes typically feature good HVAC efficiencies, more insulation, and better shading than that of standard homes.



Green Builder Program / VL1103

This home in Austin earned four stars, the highest rank possible, from the Green Builder Program. The home is located on an in-fill lot, was built from nontoxic materials, and features exemplary indoor air quality.

“Investments in energy-efficient buildings keep money in the community and yield twice the number of jobs as the same investments in energy supply.”

— Doug Seiter
Energy Star/Green Builder Rating
Program Manager
Austin, Texas

Three-star homes are designed to be even more energy efficient and use high-efficiency HVAC equipment.

To encourage interest, the city publishes the list of participating builders, and the local utility offers a rebate to Energy Star builders. Over the years, market pressure has grown to the point that consumers now request an Energy Star rating when they purchase a new home, and builders use Energy Star ratings in their advertising. Homes are rated based on plans, specifications, and other information provided by the builder, and 40% are inspected in the field to verify compliance. According to Seiter, major discrepancies rarely occur between the plans and actual construction.

Energy Star is one of many demand-side management programs developed in response to a mandate by the Austin City Council requiring the local municipal utility to find alternatives to building new power plants. Demand-side management uses renewable energy technologies and energy efficiency measures on the

customer’s side of the meter to reduce demand for energy. Because the utility plans its capacity needs around average per-home kilowatt (kW) savings, actual measured energy savings determine the program’s efficacy.

“To be cost effective,” says Seiter, “the Energy Star program must produce energy savings at less than the cost of new generating capacity. For example, the cost to build a pulverized-coal power plant is about \$1,550 to \$1,700 per kW, excluding operation and maintenance, fuel, and other operating costs. The Energy Star Rating Program saves energy at a cost of about \$400 per kW. This is a very cost-effective program.”

In 1992, the Energy Star Rating Program was expanded to create the Green Builder Program, which includes in its ratings environmental criteria relating to water, building materials, and solid waste in addition to energy.

San Francisco’s Mandatory Residential Energy Conservation Ordinance

Ideally, energy efficiency should be an integral part of the planning and design stages of every building project. But what about the housing we already have? You can upgrade the efficiency of existing housing in your area without breaking tight budgets. Lesley Stansfield, who administers San Francisco’s Residential Energy Conservation Ordinance (RECO), points out, for example, that “RECO has reduced the amount of energy the average home uses in this city by more than 15%, and we’ve done it without costing the city treasury a dime.”

RECO, adopted in 1981, is a prescriptive code that is simple to understand and easy and inexpensive to enforce. RECO requires such energy-saving

"The ordinance has reduced the amount of energy the average home uses in this city by more than 15%, and we've done it without costing the city treasury a dime."

—Lesley Stansfield
Senior Housing Inspector
San Francisco, California

measures as adding insulation; caulking and weather-stripping doors, windows, and other openings in the building shell; insulating hot water heaters and pipes; installing low-flow faucets and shower heads; installing low-flush toilets or flush reducers on existing toilets; and insulating heating ducts. Once RECO is triggered, homeowners or landlords must hire a private contractor to install the prescribed energy efficiency measures or do it themselves. A compliance inspection is then required to assure the work was completed.

Several events can trigger the need for compliance with RECO, including the sale of a building; metering conversions (changing from a master to individual meters, for example); improvements greater than \$20,000 for single and two-family homes, \$6,000 per unit for buildings with three or more units, or \$1,000 per unit for

residential hotels; condominium conversion; or a complete building inspection (for adding or combining units, for instance). To give the ordinance teeth, an Order of Abatement can prevent the transfer of property unless the owner complies with RECO.

In spite of initial sharp opposition from the real estate community, the ordinance is now a routine part of doing business in San Francisco. Acceptance was helped along by extensive publicity, an informed public, involvement of the private sector from the beginning, and training workshops for both city and private inspectors. The simplicity and cost-effectiveness of the measures required for compliance also play a part in RECO's success.

Conclusion

To be successful, any energy efficiency program must be easy to understand and inexpensive to administer. It should include educational efforts targeting all the players involved in the building process—architects, designers, engineers, builders, building inspectors, and the general public. Voluntary programs should also include incentives, such as free publicity. Mandatory programs should include enforcement strategies, such as financial penalties.

The benefits of energy efficiency go beyond simple dollar savings. Lower utility bills result in increased disposable income for homeowners and profits for businesses. Some of this money will be spent in the community, providing local economic development and jobs. You, too, can build up these benefits within your community by adopting well-designed standards or codes. ■



David Weinrub, San Francisco Convention and Visitors Bureau

Even San Francisco's famous century-old Victorian row houses have contributed to the city's 15% reduction in residential energy use. The city's building code addresses both new and existing buildings.

Creating Your Program

Tailoring a program to your locale will take some effort, but the community will be enjoying the rewards long after the challenges of developing and implementing the program are forgotten. Successful programs have several features in common:

- A long-term commitment and budget support from local government
- Simple, easy to understand requirements
- A sound technical basis
- Involvement of and support from the local building industry
- An effective marketing effort targeted at consumers and the building community
- A way to integrate compliance into normal business practices
- Sponsoring groups that inspire respect, such as the local utility and building department
- Low cost or no cost to consumers and industry.

Fine-tuning a local energy efficiency program requires good information on what building strategies are most effective in your area. In regions with cold winters, for instance, strategies should include insulating and tightening the building envelopes and optimizing solar gain. In warmer climates, energy savings come from appliance and equipment efficiencies combined with strategies that minimize solar gain in the summer. The National Appliance Energy Conservation Act's appliance standards are useful for saving energy in homes, especially in warm regions of the country (see *For More Information*). The Automated Residential Energy Standards software, available from the U.S. Department of Energy, allows users to customize an energy efficiency package for a particular site (see box p. 2).

Other useful approaches include working with local utilities to develop or improve rebate or energy education programs,

developing and distributing a local "Energy Resource Guide," retrofitting homes in redevelopment areas, upgrading the energy efficiency of planned low-income housing, and holding seminars and workshops for building and design professionals and local residents.

The Energy Policy Act of 1992 (EPACT) should help in these efforts by requiring states to review the energy efficiency measures in their residential building codes and determine whether they should be upgraded. Although EPACT doesn't require states to actually adopt codes, it should have the effect of raising awareness of the importance of energy efficiency in residential construction.



City and county officials can stimulate the local economy with well-written building codes that help create jobs and keep energy dollars at home. A key element of these codes is to offer construction professionals options in building and designing energy-efficient homes.

Warren Gretz, NREL / VL1104

For More Information

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Model Energy Code 1993

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(800) 527-4723

*Energy-Efficient Design of New Low-Rise
Residential Buildings*

Home Energy Rating System (HERS) Council

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(202) 638-3700

DOE Regional Support Offices

The DOE Office of Energy Efficiency and Renewable Energy reaches out to the states and private industry through a network of regional support offices. Contact your DOE regional support office for information on energy efficiency and renewable energy technologies.

Atlanta DOE Support Office

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John Morrill

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(202) 429-8873

Mr. Morrill has information on the National
Appliance Energy Conservation Act.

Urban Consortium Energy Task Force

Public Technology, Inc.
1301 Pennsylvania Avenue, NW
Washington, DC 20004
(202) 626-2400

The UCETF, which works extensively with
local governments to document and help share
their experiences, represents an excellent infor-
mation and technical assistance resource.

EREC

P.O. Box 3048
Merrifield, VA 22116
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